Army Science & Technology

C3I Portfolio Overview

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DESIGN • DEVELOP • DELIVER • DOMINATE
SOLDIERS AS THE DECISIVE EDGE

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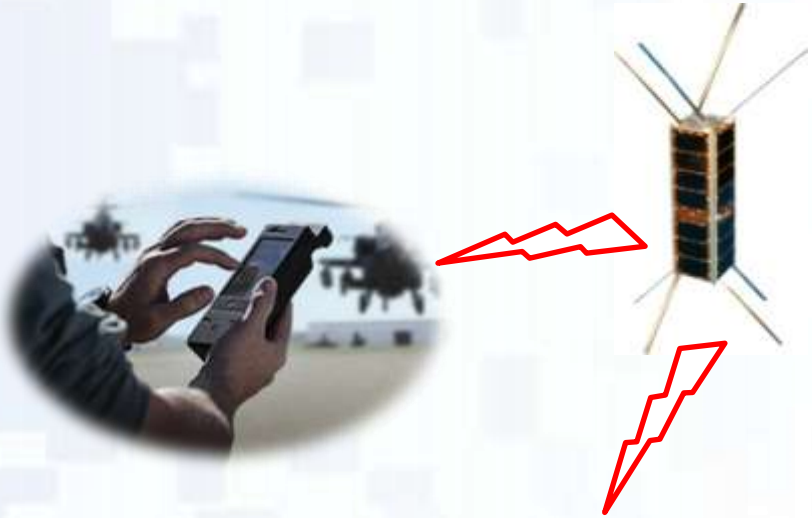
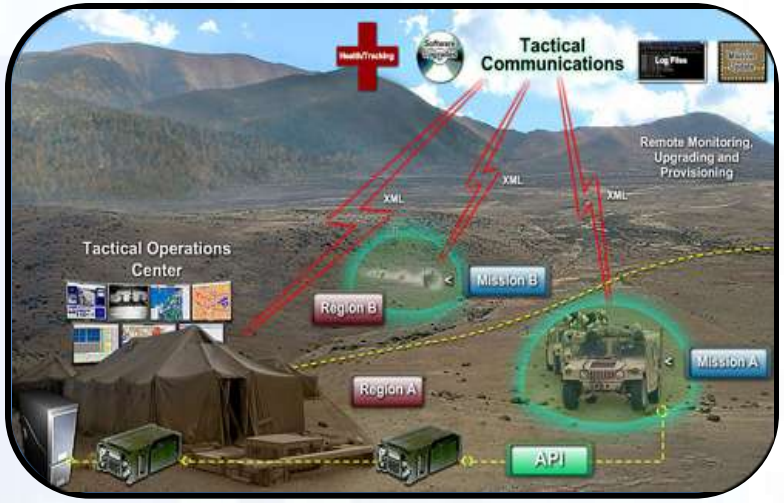
Command, Control, Communications, Intelligence (C3I) Portfolio

Vision

Soldiers at the tactical edge have trusted and responsive sensors, communications, and information adaptable in dynamic, austere environments to support battlefield operations and non-kinetic warfare





Adapt - Adopt - Develop

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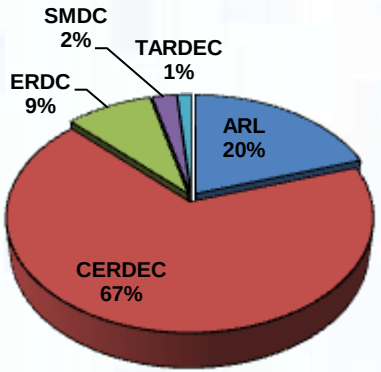
FY14

C3I Portfolio

C3I Portfolio

6.2 and 6.3 Funding

$334M



Communications	Mission Command	Sensors	Intelligence / Electronic Warfare
$72M	$100M	$120M	$43M
Investment Areas - Antennas - Mobile Networking - Network Protection - Space	**Investment Areas** - Information Planning - Presentation/ Displays - Battlefield Environments	**Investment Areas** - Electro-Optical - Infrared - Non-Imaging - Radio Frequency - Counter Sensor/ Sensor Protection - Sensor Integration	**Investment Areas** - Information Fusion - Electronic Warfare

Source: Army Science and Technology Management Information System (ASTMIS) PB14

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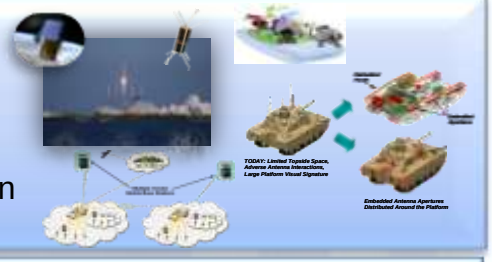
C3I - Communications Sub-portfolio

Goal: Provide aware, adaptive, secure, on-demand communications from Battalion to the Squad level in all environments and terrains to allow the Soldier the connectivity and situational awareness necessary to complete the mission

S&T Major Efforts Include:

- Affordable, Low Profile Terrestrial & Satellite Antennas
- Tactical Information Assurance and Mobile Networking
- Communications/Antenna Modeling & Simulation
- Electromagnetic compatibility and interference mitigation



Near Term Objectives:

- Components and materials for conformal multiband antennas
- M&S to minimize cosite interference for extend effective range of comms systems and jammers
- Software for policy-based spectrum & network management tools
- HW/SW for Bi-directional cross domain communications
- Intelligent agent software for security applications, cloud computing, and application authentication to minimize the effectiveness of computer network attack

Mid-Far Term Objectives:

- Operating through the presence of cyber operations and electromagnetic attacks
- Communications interoperability/integration across heterogeneous systems
- Enable effective communications and operations in a spectrum constrained environment
- Self healing self managing network
- Lower/no signature communications/Antennas

Legacy/Existing Systems include:

- WINT
- EPLRS
- SINCGARS
-CREW
-FBCB2

Army Stakeholders:

- ARL
- TARDEC
- CERDEC
- PEO Soldier
- PEO IEWS
- PEO MS
- PM DCATS
- SMDC
- PEO C3T

External Stakeholders:

- Office of Naval Research
- DARPA
- Air Force Research Lab
- Space Test Program

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C3I - Mission Command Sub-portfolio

Goal: Develop methodologies for secure, timely, data storage, mining, processing and retrieval to effectively manage digital assets (imagery, applications, geospatial, environmental) for knowledge based decisions over available communications assets from Battalion down to the Squad/Soldier

S&T Major Efforts Include:

- Decision Support and Mission Execution Tools
- Fine resolution atmospheric modeling and local area meteorological forecasting
- Integrated Soldier based Battlefield Combat Identification
- Geospatial Tool design, and development
- Position/Navigation in GPS denied environments

Near Term Objectives:

- Reduce tactical surprise by providing proactive decision support tools, red/blue SA, improved access to high value information, mutually supportive collaboration, and target ID and handoff capabilities across a range of network conditions
- Develop actionable geospatial, population and environmental data, information and pattern software services
- Low SWaP/cost CID technologies for dismounts

Mid-Far Term Objectives:

- Virtual mobile mission command capability common in the generating and expeditionary force
- Ad Hoc Small Team Collaboration capabilities
- Non-Cooperative target identification for dismounts
- Fusion, exploitation and dissemination of Ad Hoc data from unknown data sources to feed right person, right data

Legacy/Existing Systems include:

- FBCB2
- Tactical Ground Reporting System TiGR
- AN/PSQ-23 STORM Laser Rangefinder
- AN/PEQ-2 & AN/PEQ-15 Laser Pointers

- PLGR, DAGR

Army Stakeholders:

- CERDEC
- ERDC
- ARL
- PEO C3T
- PEO IEWS
- ARDEC
- NATICK
- PEO STRI
- PEO Soldier

External Stakeholders:

- DARPA
- USMC
- Air Force
- NOAA
- NASA

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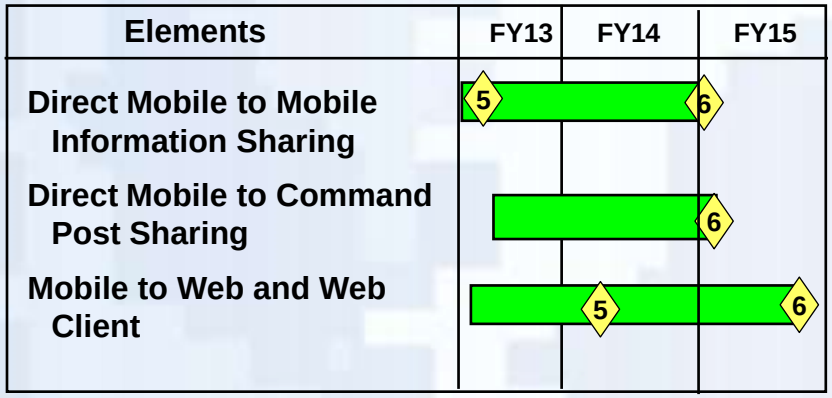
Tactical Information Sharing

Purpose:
Develop software tools for Android and Web based environments that let Soldiers more easily share information, ask questions to larger communities, and filter for relevant information in a way that is consistent with familiar social networking tools.

Products:
- Mobile Tactical Client Applications
  - Web application (HTML5 + Javascript)
  - Android handheld application
- Local server based applications to provide capability at lowest echelons and minimize use of bandwidth
- Web Services for 3rd parties to access capability

Payoff:
- Soldiers achieve a greater understanding of their environment by sharing observations about enemy activity
- Soldiers are more operationally agile because the can more effectively collaborate.
- By providing more flexible tools with a familiar user experience Soldiers can better adapt as needs on the ground change

Schedule



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C3I – Sensors Sub -portfolio

Goal: Improve SA, targeting and target handover by effectively integrating/networking sensors and sensor data from traditional and non-traditional sources to extend coverage, lower false alarm rates and increase probability of detection of moving and stationary air and ground threats

S&T Major Efforts Include:

-Infrared sensor, component, and modeling development
-Soldier sensor components and image processing
-Acoustic & Electro-Magnetic sensing
-Radar antenna, transmit/receiver modules and software technique development and testing
-Radar (SAR/GMTI) & SIGINT data processing and exploitation

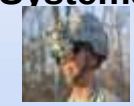
Near Term Objectives:

- Precise targeting handoff for dismounts
- Provide affordable near 360º situation awareness in complex/urban terrain for ground vehicles
- 3D Detection, ID and Precision Geo-location of Modern Comms thru Multipath /Co-Channel Interference and Jamming
- Reduce detectability of existing camouflage nets by IR sensors
- Affordable high quality 1280 X 720 dual band SLS Arrays
- High Operating Temperature , large format (5000 X 5000) MWIR sub-arrays

Mid-Far Term Objectives:

- Develop affordable high definition cooled and uncooled IR FPAs
- Network sensors to permit smart sensor management, correlation, cross-cueing and integrated tracking of threats
- Cost effective persistent surveillance (persistent area assessment)
- Mining "patterns of life" action-able intelligence from gigabytes of raw E-sensor data

Legacy/Existing Systems Include:



- 2nd Gen FLIR
- Enhanced Night Vision Goggle
- Guardrail Common Sensor
- Persistent Threat Detection System (PTDS)
- AN/TPQ 36/37 Firefinder Radar

Army Stakeholders:

- ARL
- NSRDEC
- CERDEC
- PEO Aviation
- PEO IEWS
- TARDEC
- TRADOC
- PEO M&S
- PEO Soldier

External Stakeholders:

- DARPA
- Air Force Research Lab
- Naval Research Lab
- SOCOM

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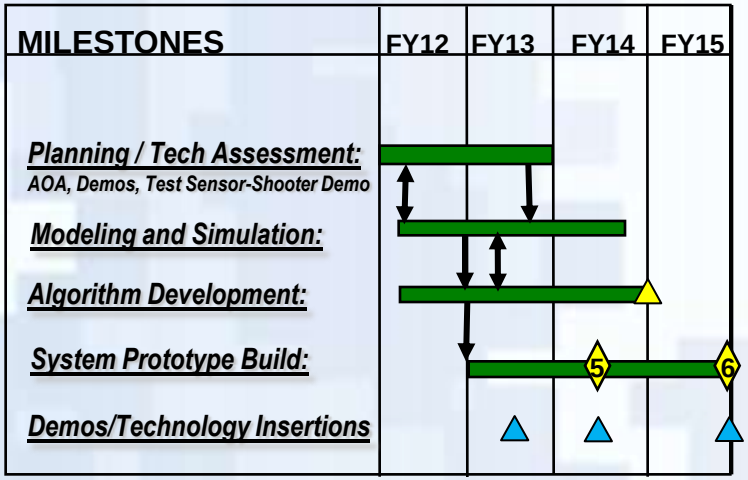
Persistent Surveillance Sensors (PSS)

Mast Mounted Advanced Sensors Increases Force Protection and Enables Lethality Against Full Spectrum Threats (including hybrid and small UAV) – *Via Ground Based Persistent Surveillance*

Schedule



Purpose:

Demonstrate ability to detect and recognize personnel targets and small UAVs, via ground based passive Infrared Search and Track (IRST) persistent surveillance

Products:

- Demonstrate enhanced passive/active scalable, wide area, multi sensor target detection and recognition and localized persistent surveillance capability that includes
- Large format infrared focal plane array for detection, identification and persistent surveillance integrated into tower based platform
- IRST algorithms for passive personnel and UAV detection
- Integration with existing RADAR for Electro-optic/ infrared sensor slew-to-cue (detect moving personnel threats)

Payoff:

- Long range rapid passive and positive recognition of personnel targets and detection of UAVs for improved force protection against the asymmetric threat

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C3I – Intelligence and Electronic Warfare Sub-portfolio

Goal: Provide maneuver forces the ability to detect, identify, exploit, locate in 3 dimensions, disrupt and neutralize, IEDs, tactical and modern RF signals and advanced devices in a dense signal environment

S&T Major Efforts Include:

- Tactical multi-function electronic warfare planning and management tools and techniques
- Jamming techniques for counter IED missions
- EO/IR/RF Countermeasures for helicopter survivability
- Architectures and standards for intelligence data collection (RADAR, SIGINT, HUMINT)
- Attack/exploitation tools (Techniques development and testing
- All-Source SA, analytics and exploitation software applications development

Near Term Objectives:

- Provide Small Units with tools and training to efficiently collect, process, exploit, and disseminate data to support situational awareness and decision making
- Develop ability to exploit unconventional sensing modalities for more robust threat detection (magnetic, e-field, hyperspectral)
- Develop surgical techniques to disrupt and or neutralize emerging threat signals

Mid-Far Term Objectives:

- Coexistence of Comms and EW in the same spectrum without impact to either mission
- User-context-tailored, real-time, mixed reality / augmented reality SA and COA
- User aware Process Exploitation and Dissemination of information and Intelligence
- Detect, identify, exploit, locate, disrupt and neutralize RF systems in dense co-channel, and multi-path environments

Legacy/Existing Systems include:

- DCGS-A
- ABCS
- FBCB2
- CREW
- AAR-47 Navy UV Warner
- ATIRCM Infrared CM

CREW Duke V2 System

DCGS-A System

Army Stakeholders:

- CERDEC
- ARL
- SMDC
- AMRDEC
- PEO C3T
- PEO IEWS
- ARCYBER
- INSCOM
- Army G2

External Stakeholders:

- DARPA
- OSD
- AFRL
- NRL
- NRL
- NSA
- SOCOM
- SPAWAR
- NSWC
- Navy
- PMA 272

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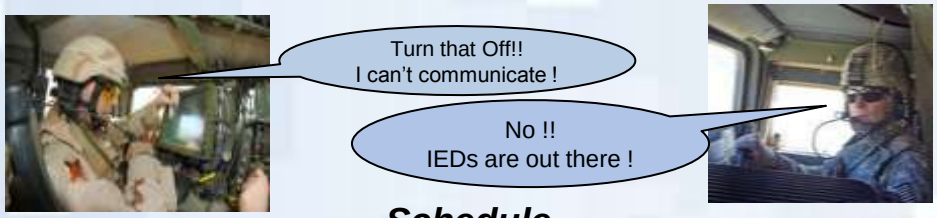
Integrated EW / Comms



Purpose: Enable EW and tactical communication systems to operate at the simultaneously without compromising each other.

Product:

- Algorithms & Software to coordinate spectral utilization of EW & Communications functions
- Power Amplifier model that predicts unintended jammer emissions
- Interfaces specification for interface between collocated EW & Communications systems
- Simulation environment to facilitate protocol development & compatibility testing
- System prototype Demonstration

Payoff:

- Minimal reduction of COMMS throughput, range, and frequency tunability due to co-site EW system.
- EW effectiveness or range is not reduced to accommodate co-site Communications.

Schedule

Schedule & Cost	FY11	FY12	FY13	FY14	FY15
Market Survey					
Characterize EW System Output					
Investigate configurability and data provided by SRW & EW systems					
Scheduling Algorithm					
Inter platform coordination protocol					
Interface between collocated EW & Comms system					
Simulation Environment					
Overall System Architecture					
Signals Management module			3	4	5
Modify EW and Comms waveforms to implement algorithm selections					
Integration & Testing					6

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C3I S&T Portfolio Summary

- C3I Portfolio Challenges
  - Portfolio is complex and significantly impacts other S&T and capability portfolios
  - The rapidly changing commercial electronics market is difficult to adapt to Army capabilities

- Disruptive and Leap-Ahead technologies such as nano-satellites and EW/Cyber capabilities can give the Army an edge in future conflicts

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WebPortal for Army wide Industry Engagement

Defense Innovation Marketplace

http://defenseinnovationmarketplace.mil/armyInformation.html

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Providing Soldiers Technology Enabled Capabilities

MAINTAINING A LEADING EDGE IN TECHNOLOGY